molten state of glass revealing the universe reflecting begins

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Työn nimi molten state of glass – revealing the universe – reflecting begins

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Tiivistelmä

Tämä maisterin opinnäytetyö on autoetnografinen, tarinallinen tutkielma opetusfilosofiani selkeyttämiseksi. Tutkimusasetelmani perusta muodostuu kokemuspohjaisesta tiedostani lasinpuhaltajana ja lasinpuhalluksen opettajana. Kiinnostuessani uusmaterialismista, joukosta nykyaikaisia teorioita, jotka suuntaavat tutkimusta ihmiskeskeisyydestä kohti materian toimivuutta, muodostan olettamuksen, että opetusfilosofiaani sisältyy jo valmiiksi uusmaterialistisia piirteitä. Tutkimuskysymykseni – kuinka uusmaterialistinen ajattelu ilmenee opetusfilosofiassani – opastaa minua autoetnografiseen pohdintaan.

Tässä tutkielmassa esitän henkilökohtaisen näkemykseni olennaisimmista lasinpuhallustaidoista. Kinesteettisenä oppijana itse, pyrin selventämään kehon ja mielen yhteyden merkitystä lasinpuhallustaidon perustana. Esittelen lasin sulan olomuodon keskustelevana, tehokkaana palautteen antajana. Tutkielmani edistyessä löydän materiaalisen feminismin, prosessiontologiat ja aineen väreilevyyden selittämään pedagogista ja elämänkatsomuksellista ajatteluani.

Tutkielman metatasolla kulkeva alisteinen tutkimuskysymys – mitkä ilmiöt lasinpuhalluksessa kuuluvat taidekasvatukseen ja miksi? – provosoi syventämään suomalaisen lasiopetuksen taideperustaisuutta. Näkemykseni on, että kuuma lasi on erinomainen taiteilijan ajattelu- ja tutkimuskumppani nykyajan ilmiöitä pohtiessa.

Avainsanat autoetnografia, lasinpuhallus, taidekasvatus, opetusfilosofia, uusmaterialismi, materiaalinen feminismi, prosessiontologiat, materian väre

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Abstract

This Masters' thesis is an autoethnographic narrative inquiry to specify my teaching philosophy towards a clearer understanding of myself as a teacher. The foundation of my research setting forms from my experience-based knowledge as a glassblower and a glassblowing teacher. After becoming curious about new materialism, a current theoretical orientation that turns from anthropocentrism towards the vitality of matter, I form a hypothesis that my teaching philosophy already includes new materialistic features. The main research question – how does new materialism appear in my teaching philosophy? – guides me to conduct an autoethnographic reflection on my thinking. In this thesis I present an intimate, insider view to my ideas about the essential skills in glassblowing. As a kinesthetic learner myself, I strive to make sense of the body-mind connection that is a foundation in learning to blow glass. I explain the molten state of glass as a responsive, dialogical material to think with. During my research, I find material feminism, process ontologies, and vibrant matter to explain my pedagogical thinking, and my view of life.

An underlying research question – what kinds of phenomena in glassblowing belong in art education and why? – is a provocative meta-level initiative towards an art-based paradigm in Finnish glass education. I recognize hot glass as an extraordinary material for artists to think and research contemporary phenomena with.

Keywords autoethnography, glassblowing, art education, teaching philosophy, new materialism, material feminism, process ontologies, vibrant matter

Contents

JOSIAH MCELHENY
Observation Night Three
2019

Acrylic on board with inset, hand-formed and polished micromosaic glass,
black mirror, ash frame
55.6 x 55.6 x 5.4 cm

Image courtesy of James Cohan Gallery, New York, New York, United States.

INTRODUCTION

After teaching glassblowing professionally for over a decade I came to my graduate studies with a pragmatic background. In this Masters' thesis, I conduct autoethnographic research to specify my teaching philosophy in a new materialistic context.

The research setting in this thesis consists of my experience-based knowledge as a glassblower and a teacher. I argue that my pedagogical views included aspects of new materialism before I knew what new materialism was. In this thesis, I describe my pedagogical thinking and examine it under the guise of new materialistic theories to investigate and prove my supposition. The main research question – how *does new materialistic thinking appear in my teaching philosophy?* – guides the process.

Whereas this thesis has a strong personal motivation to theorize my pedagogical thinking towards an academic art educational paradigm, I strive to introduce glassblowing as a practice that calls for diverse courses planned from an art educational perspective. The underlying research question – *what kinds of phenomena in glassblowing belong in art education and why?* – is a meta-level inquiry to a hypothetical idea of merging glass in art education.

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During the Masters' Thesis Seminar in Art Education at Aalto University in 2019, I was introduced to new materialism as a current and compelling theoretical orientation. This sparked my interest, and I soon found myself listening to recorded lectures[1] by Karen Barad, a theoretical physicist and feminist theorist. Even though I am unable to

[1] See References / Online-sources.

understand Barad's lectures in full detail, and therein cannot argue for or against their theories, I do recognize Barad as my first intellectual inspiration that drove me to learn more about new materialism. Barad's courage to argue and intertwine theoretical physics with humanities, bringing in questions of justice and ethics, is inspiring. As a glassblower and a teacher of glassblowing, I am thoroughly exposed to the concrete manifestations of chemistry and physics. I sense the glass with my visual and somatosensory systems and physically work with the laws of science. In addition, my relationship with glass has felt metaphysical since an early age, as I will explain in this thesis. In this thesis, influenced by Barad, I encourage my curiosity to draw more from new materialistic thinking. For example, whereas Barad talks about agents[2], I find Bruno Latour's idea of actors, actants[3] in a process more consistent with my thinking. As a glassblower the glass is my partner, and together we are indistinguishable actors in the process of glassblowing. This is the idea that I pursue to guide my students towards. The idea of having an intra-relational connection with human and non-human matter[4] arises central to my thinking.

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The evolving international discourse in glass motivates me as a teacher to rethink how I teach glass. In this light, my thesis is a proposal to shift the paradigm in Finnish glass education. In my experience, glass in Finland has a stature of designers' material, where an expressive, artistic view of glass has suffered from the lack of resources for education and research. This has resulted in an absence of discourse, wherein a healthy critical environment that fosters new perspectives to use glass as artists' material, does not exist in Finland. The work of a glassblower being mystified behind a designer cult has not eased the status of glassblowing. As I follow my field of expertise internationally, I see

[2] See Neimanis (2018).
[3] See Bennett (2010).
[4] See Bennett (2010).

how glass has become a more prevalent in contemporary art. Definitive labels such as a glass artist, glass art, and art glass can be rightly forgotten when glass is perceived in the context of conceptual art. With this notion I pursue to introduce glass as a vibrant material for artists, and glassblowers as specialist professionals who often work as fabricators in an artist-artisan relationship (Petry, 2011). Therefore, it is my position that there is a need to educate glassblowers in terms of art, and artists in terms of glass.

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In the first chapter, I present my theoretical background: autoethnography as the research method in this thesis, and new materialism as the philosophical mirror I reflect on. The main theoretical references are Autoethnography by Adams, T. E., Holman, J. S., & Ellis, C. (2014), Posthuman Glossary by Braidotti, R. & Hlavajova, M. (2018) and Vibrant Matter by Bennett, J. (2010). The second chapter in this thesis guides the reader to glassblowing through a short historical overview. I introduce glassblowing as a profession and glass as a material with an interesting connection to Baruch Spinoza, a philosopher who has turned out to be important in current posthuman thinking.[5] The second chapter ends with a presentation of my pedagogical working environment, and myself as a teacher. The actual research into my teaching philosophy is conducted in the third chapter. Through autoethnographic writing, I discuss themes I consider essential in teaching and learning glassblowing. To each theme, I propose an applicable new materialistic theory to test my thinking. Conclusions, as the fourth and final chapter, consolidates my thesis and suggests further discussions. The references that follow the fourth chapter, lists the sources used in this thesis.

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[5] See: Bennett (2010) and Dolpijn & van der Tuin (2012).

This thesis was mainly written in March and April 2020. Therefore, it reflects on the COVID-19 pandemic that I consider as a historical era. The state of emergency has affected my thinking in a way that the perspectives in this thesis shifted to be more intimate.

The current European discussion about including glassblowing on UNESCO's Lists of Intangible Cultural Heritage adds to the topicality of this subject. In Finland, glassblowing is already recognized as a national living heritage, and documented as part of UNESCO's Convention for the Safeguarding of Intangible Cultural Heritage. (Lauren, 2020.)

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CHAPTER 1 /Theory

As a teacher whose subject is based on an antique skill of glassblowing, I am curious to analyze my thinking in a contemporary context. This first chapter presents the theoretical framework of my research. I begin with introducing autoethnography as my research method followed by the initiation of new materialism.

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AUTOETHNOGRAPHY

> *"Autoethnography" is an approach to doing and representing social research that uses personal ("auto") experience to create a representation ("graphy") of cultural ("ethno") experiences, social expectations, and shared beliefs, values, and practices.".* (Adams & Holman, 2018.)

Despite completing my professional teacher studies as recently as 2012 and having done reflective writing almost all my adult life, autoethnography as a research method is new to me. I am curious to find out how to represent my pedagogical thinking and theorize the philosophical base I teach from. This curiosity towards my own thinking is essential in forming the research setting in this thesis, and answer my research question – *how does new materialistic thinking appear in teaching philosophy?*

Citing Dwight Conquergood (2002), Tony Adams, Stacy Holman Jones, and Carolyn Ellis summarize that in autoethnography, *"proximity, not objectivity, becomes an epistemological point of departure and return."* (Adams, Holman, & Ellis 2014, p.23). To me, the proximity represents an ethical choice I make when choosing my perspective and the reflective, narrative voice. Through my writing I get to analyze my thinking and find eventual evidence of new materialistic thinking.

Patricia Leavy (2017) includes autoethnography in qualitative, literary arts-based research methods among other narrative ways of representation (Leavy 2017). Adams, et al (2014) state, that it is only in recent years that autoethnography has become a legitimate method in disciplines like education, psychology, art, and economics. Deriving from ethnography, and the "*crisis of representation in the human disciplines*" (Adams et al, 2014, p.9), the origins of autoethnography are in the 1970's. It started to gain its own scientific status as a qualitative research method towards the end of the 1980's. Personal narrative, subjectivity and reflexivity in research began to be advocated for in sociology and gender studies. (Adams et al, 2014.)

As a teacher, I want to give my students access to my thoughts on the subject I teach. In this thesis, I describe what is essential in glassblowing from an insider point of view. I find it interesting that it is this very intimate approach to research that autoethnography is criticized for not being academic enough and thus could not be evaluated as a scholarship (Adams et al, 2014). I understand the debate and welcome the critique as it is needed to create a healthy research tradition in any academic study.

During the time of my thesis work, especially between March 16th –April 30th, 2020, I have done self-reflection through walking (on average 11 400 steps per day[6]) and writing. I am a practice oriented kinesthetic learner myself. Being in motion helps me to concentrate and think. Motion allows me to effectively use remembering as a research method. While walking I have taken "*field notes*" (Adams et al, 2014, p.69) on my iPhone Notebook. It is while walking that I have structured my thesis and reflected not only on glassblowing processes but on the philosophical appearances the process unveils.

Adams et al (2014) remind of the crisis of representation in humanistic disciplines if researchers separate themselves from their study. As a solution to this crisis they present organizational theorist John Van Maanen's topology of ethnographic representational forms that help merge the voice and the focus of the researcher. Adams et al (2014) add

[6] According to my iPhone tracker.

to Van *Maanen's realist, impressionist, and confessional forms* of representation the *expressionist and conceptualist* forms. Further, they note that all these representational forms can be used in an overlapping manner to find one's own representational voice. (Adams et al, 2014, p.83–84.) My representation is mostly a mixture of expressionism and conceptualism. As an expressionist I seek the readers emotional engagement to my narration. The highly reflexive conceptualist in me does not mind breaking the silence. (Adams et al, 2014, p.87–89.) That said, the form of the autoethnographic representation in this thesis is a narrative description of my thoughts about the essential skills in glassblowing.

My *lived experiences* as a glassblower and a teacher is the basis of my representation. I seek to share my understanding of the significant, transformative accounts of glassblowing, and further, describe the process of glassblowing in a way that others, who are not familiar with glassblowing, can understand the complexity of it. In addition, I hope that my thesis can be shared with non-academic audiences. Adams et al (2014) talk about *"providing a perspective that others can use to makes sense of similar experiences."*. (Adams et al, 2014, p.27.)

To enhance the reporting of my lived experience, and to invite the reader as close to me as possible to get the first-hand information I am offering, I use the first-person voice in my writing. When I want the reader to reflect on my views, I use the second-person voice, indicated by using "you". This, according to Adams et al, *"invites the readers to see themselves as people capable of thinking and feeling."*. (Adams et al, 2014, p.78).

Based on *inner dialogue*, I contemplate the process of glassblowing using analogies and metaphors to make sense of the intimate, embodied knowledge that I have as a glassblower. In the Handbook of Art-Based Research (Leavy, 2018), Adams and Holman define inner dialogue as one of the artful components in autoethnographic

narrative writing (Adams & Holman, 2018). Together, with the aforementioned first- and second-person voices, I find this method significant in my aspiration to translate my embodied knowledge to the reader.

I use analogies in their simplest way, to describe things. In their textbook for critical thinking, Malcolm M. Murray and Nebojsa Kujundzik (2005) explain an analogy as a link between two things that are similar. Murray and Kujundzik confirm my experience of analogies being helpful when explaining a novel concept or a practice to a new audience. (Murray & Kujundzik, 2005.). On the use of metaphors, George Lakoff and Mark Johnson (2003) say that we can refer to, and reason about, our experiences only after identified them as substances or entities (Lakoff & Johnsen, 2003). I am aware that my analogies and metaphors might not reach every reader and that my way of making sense is not the only way. Adams (2014) reminds that autoethnographers *"insight to cultural experiences is not the only way of making sense of them."* (Adams et al, 2014, p.30). In my teaching, I find these comparisons important when describing specific embodied sentiments to students so that they could recognize the tacit knowledge forming in glassblowing practice and grab onto it.

Haiku and prose can be used as autoethnographic writing techniques (Adams et al, 2014, pp.23, 75). This notion makes me happy as writing haiku has been my secret practice for some years. As a fun memory from my early graduate studies, I did joke with a course mate that if possible, my whole thesis would be presented in one 5-7-5 syllables poem. Stacy Holman Jones's encouragement to an autoethnographic writer made me return to haiku writing from the early stage of my thesis process.

> *"Experimenting with form can help you find a story form that most readily captures the feeling, movement, and potential meaning of an experience."* (Adams et al, 2014, p.75).

The title of this thesis – and the two other haikus I share in this thesis -are among the first public poems by me. To me, haiku represents an ultimate verbal crystallization of the essential.

Having made analogies to music and sports in my teaching, I find it appropriate to cite David Carless and Kitrina Douglas, musicians and autoethnographers. Their contribution in *Music autoethnographies: making autoethnography sing/making music personal,* talks about how the process of songwriting represents a means of knowledge creation. Carless and Douglas see that the incorporation of knowledge is supported by the interconnecting elements of music, the instrument, and the musician's body (Carless & Douglass, 2009). I consider both making music and blowing glass as embodied creative processes that create new knowledge throughout the whole course of action.

NEW MATERIALISM

Coming to theoretical thinking with a strong pragmatic grasp on living, and an occasional mind of a poet, my reading into new materialism is a process of constant contemplation on the practical manifestations of my life. As outlined in the introduction of this thesis, my interest in new materialism arose during Masters' thesis seminar in 2019. With Karen Barad leading the way as my original inspiration I have explored posthuman and new materialistic thinking for this thesis. In search of reference literature, I came across a quote from Nietzsche that adequately describes my own experience-based research:

> *No one can draw out of things, books included, more than he already knows. A man has no ears for that to which experience has given him no access.*
>
> *Friedrich Nietzsche, Ecce Homo*[7]

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New materialism presents contemporary paradigms for structuring our thinking in the 21st Century. It provides novel ways to theorize the world we live in by seeking out ways to reposition humans with non-human actants, therein removing humans as central focus. (Sanzo, 2018). Advocating new materialism, Diane Coole and Samantha Frost (2010) explain the need for novel perceptions of materialism as natural sciences greatly progressed in the 20th Century. Materiality of today is more complex than materialism based on Newtonian mechanics, the scientific canvas for thinkers like Nietzsche and Marx in the 19th Century. Further, the recent scientific and technological advancement raises ethical and political concerns with regards to matter, which requires new ways to consider *"the nature of matter and the matter of nature"* (Coole & Frost, 2010, pp.5–7).

[7] Baltas, A. (2012).

As a glassblower, I am in symbiotic motion with the laws of nature. Thus, I recognize the references to natural sciences Coole and Frost make in their *New Materialisms: Ontology, agencies and politics* (Coole & Frost, 2010). My interest to learn more about new materialism grows with my reading process. Again, with no former education in philosophy I miss many of the historical references but decide to continue my study. I realize how perceiving human and non-human matter as equal agents in action supports my layperson's thinking. I start to think that the dialogical relationship between a glassblower and hot glass is an embodiment of new materialism in action, in motion.

In *Vibrant Matter*, political theorist Jane Bennett (2010) turns conservative thinking upside down/inside out by defining vital material anew. Bennett asks what political turns would happen if we were to acknowledge the vitality in non-human matter. As an example, referring to Bruno Latour's term *actant*, Bennett ponders upon a different energy political attitude to electricity if we were to figure electricity as a vital actant instead of the traditionally understood qualities like "resource, commodity, or instrumentality" (Bennett, 2010). I am intrigued by the expressive nature of the term actant and think it relates well into the dialogical process of glassblowing. Bennett explains the use of term as follows: *"The term is Bruno Latour's: an actant is a source of action that can be either human or nonhuman; it is that which has efficacy, can do things, has sufficient coherence to make a difference, produce effects, alter the course of events."* (Bennett, 2010, p,viii). Compared to Barad's term *agent* I find Latour's *actant* suits my vocabulary and understanding better as to me it entails more intrinsic action instead of the term agent which I consider to be more mediative by nature. The difference is probably subtle.

Reading into new materialism I continue to be surprised by similarities between new materialistic theories and the act of glassblowing. When Coole & Frost (2010) describe matter as *"constantly forming and reforming in unexpected ways"* and how *"matter*

becomes rather than that matter is"[8], I sense an immediate analogy to hot glass. On a further note, Astrida Neimanis' (2018) contribution to Posthuman Glossary (Braidotti R. & Hlavajova M.(Ed(s)), 2018) explains material feminism to be *thinking with matter* (Neimanis, 2018). Referring to *"...Barad (2012: 60), Kirby (2011: 95) and Wilson (2004: 82)..."*, Neimanis summarizes that understanding matter (non-human matter included) as *"something that feels, converses, suffers, desires, yearns and remembers, reads, writes, calculates and copulates, as well as questions, solves, controls, calculates, protects, and destroys"* suggests that matter is *agential* (Neimanis, 2018). With my twenty years of experience with hot glass I can agree to this lively description of matter. To me glass has been an active partner and guide in the profession I teach. Eventually, these explanations confirmed my curiosity in new materialism and helped to fashion my main research question, *how does new materialistic thinking appear in my teaching philosophy?*

Posthuman Glossary, edited by Rosi Braidotti and Maria Hlavajova (2018) includes over 160 entries providing an overview on critical terms with strong emphasis on neo-materialist approach. Along with Material Feminism I find Process Ontologies excellent to explicate the diversity, if even complexity, of glassblowing processes. James Williams, the contributor, explains the nature of process ontologies as transformative becoming (instead of static being) (Williams, 2018).

> *"They claim that reality is process rather than static existence and they claim that substances should give way to events. Process ontologies also deny the real existence of isolated individuals and they replace them with multiplicities of processes."* (Williams, 2018.)

[8] The whole citation: *"Matter is no longer imagined here as a massive, opaque plenitude but is recognized instead as indeterminate, constantly forming and reforming in unexpected ways. One could conclude, accordingly, that "matter becomes" rather than that "matter is." It is in these choreographies of becoming that we find cosmic forces assembling and disintegrating to forge more or less enduring patterns that may provisionally exhibit internally coherent, efficacious organization: objects forming and emerging within relational fields, bodies composing their natural environment in ways that are corporeally meaningful for them, and subjectivities being constituted as open series of capacities or potencies that emerge hazardously and ambiguously within a multitude of organic and social processes."* (Coole & Frost, 2010, p.10).

In a glassblowing process, multiplicity of actants affect the process. It is a constant flow of physical and chemical actions and reactions, paired with the biological functions of the human actant in the process (Williams 2018).

In the third chapter I refer to these fore mentioned terms – material feminism and process ontologies – in my search to clarify my teaching philosophy.

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In this chapter I have explained my theoretical framework; autoethnography as my research method, autoethnographic writing as means of representation, and new materialistic thinking as the philosophical theory. The next chapter outlines the historical and material content in this thesis and explains why I think we should find new ways to discuss glass.

sand, soda, and lime
one, the other, and the third
movement of atoms

CHAPTER 2 / GLASS

This second chapter is meant to help the reader situate themselves to my autoethnographic research presented in the third chapter. The framework of the research, based on my experiences as a glassblower and a teacher, is explained here.

In this chapter I summarize the major historical events that I find relevant as background information for this thesis. I explain glassblowing as a profession and give an insight to hot glass as a material. Further, I explicate the main myths I have confronted in the practice of glassblowing/blown glass and discuss glass as artists' material. The last paragraph of this chapter is a presentation of myself as an educator to justify my position as an autoethnographic voice in this thesis.

HISTORY OF GLASS / A quick leap from ~3000 BCE to 2020 CE

Five thousand years after the discovery of glass as a man-made material[9], *we* now live in The Glass Age[10], or as defined in terms of glass art: Post-Studio Glass Era. This timespan includes the invention of glassblowing a rough two thousand years ago, and the more recent centuries of strong industrialization. Along with automation, we stepped into Anthropocene, and methods for mass-produced glass started to improve. Eventually, in relation to a general socio-economic development in Europe and in the United States, an expressive, individual approach to glass happened within modernism. Internationally, artists and makers started to use glass as a material for artistic expression. The celebrated Mid-Century designs and the rise of The Studio Glass Movement[11] are significant when describing artistic glass of the 20th Century. Today,

[9] See for example. Klein & Lloyd, (1984), Henderson (2013).

[10] Weeks W., Corning Inc. (2016). The Glass Age defines the use of glass in architecture, technology, biomedicine and science. https://www.corning.com/worldwide/en/innovation/the-glass-age/inspiration/advancing-the-glass-age.html

[11] See for example. Klein & Lloyd, (1984), Henderson (2013).

seeing blown/hot worked glass as one of the materials used in contemporary art has become common.

THE GLASSBLOWER

By using their body as their main instrument, a glassblower works with hot glass in a dialogical manner. The molten glass is in constant motion, and so is the glassblower. The visible, physical connection between the hot gob of molten glass and the glassblower is a metal blow pipe[12]. The glassblower rolls, flips, and turns the blowpipe accordingly to keep the glass gather centered; if the motion pauses gravity draws the glass off center (and that can result in an uneven, technically poor result[13]). Moves of a skilled glassblower are smooth and prompt. The glass stays hot and malleable for an intended time-period before a possible reheat. To give the glass the wanted form, the glassblower blows it hot into a mold[14] or forms it freely by using hand tools.

The blowing of air itself is a rather swift act to increase the volume of the piece. The glassblower blows air into the blowpipe when needed. The air quickly travels through the blowpipe and expands in the hot molten glass increasing the volume of the gob.

It takes several years of practice for the glassblower to become fluent with the material. In glass blowing, there are no shortcuts to proficiency. Glassblowing demands both gross and fine motor skills, and an ability to intertwine embodied knowledge with theoretical knowledge. To gain this kind of know how it has taken the glassblower a great amount of practice to become a fluent problem-solver. In the action of glassblowing a multiplicity of varying actors creates situations that need to be addressed in a nanosecond. I often compare glassblowing to playing an instrument or doing sports.

[12] A blowpipe length varies from approximately 1300mm to 2000mm, diameters vary as well, average is D 30mm.

[13] Intentionally off-centered pieces demand skills and understanding of physics.

[14] Glassblowing molds are usually made of wood, metal, or graphite.

It takes years of devoted practice to learn, and continuous exercise to develop mental and physical skills.

A glassblower works either in a standing position or sitting at a (specifically designed glassblowing) bench. The work includes lifting and moving heavy weights. The repetitive nature of the work can affect the glassblower's body in harmful ways. The work is physically demanding, a glassblower needs to apply ergonomically optimal ways of working and adapt good posture habits.

Glassblowing is teamwork. In a glassblowing team the workload is divided between its members. In a factory setting the team is often 3 to 7 people working on the same product. The most skilled glassblower, a master, makes the most demanding part of the work and is responsible for the quality of the work. In a smaller studio the team might be 2 to 3 people. Some glassblowers work solo and have arranged their studio to create even complex work accordingly. In studio glass practice the hierarchy of the team is not as strict as in a factory.

Glassblowers work in Finland is studied in detail in Virpi Nurmi's doctoral dissertation *Glassworkers and glass manufacturing in Finland during the early 20th century (1900–1930); an ethnological study of workers and work* (Nurmi, 1989). Antti Metsänkylä and Pirkko Suutari's museological report *Chair, a glassmaking team,* documents manual glassmaking at the Nuutajärvi Glassworks in 1991–1992 (Metsänkylä & Nurmi, 1992). Both Nurmi's and Metsänkylä & Suutari's studies are made from an outsiders' position using interviews and observation as ethnographic research methods. Although the essential skills in glassblowing have remained the same through the past two thousand years, the research methods have become diversified since the 1990's. Erin O'Connor, an American sociologist, offers an insider perspective to glassblowing. She learned how to blow glass to better describe the embodied knowledge of glassblowing (O'Connor, 2005). Since then, O'Connor has written several research papers and a doctoral dissertation on glassblowing from a cultural sociologists' perspective.

HOT GLASS AND FORMING IT

A typical glass mixture used in glassblowing to make packaging and household glass, as well as glass for artistic purposes, is called soda-lime glass. The main ingredient to form the glassy structure in the composition is silicon dioxide SiO2 (quartz). Sodium carbonate Na2Co3 (soda) is added as a flux, and calcium carbonate CaCo3 (lime) as a stabilizer. Melting temperature for this type of batch is around 1300-1400 °Celsius (2375-2552 °Fahrenheit), depending on the furnace type. Glass batch does not have a steady melting point: it gradually starts to melt and keeps itself in a molten, malleable state in around 1100 °Celsius (2012 °Fahrenheit). In science, glass is considered as an inorganic solid that does not crystallize when cooled down. (Flygt & Falk. 2011.)

Glass is melted in a furnace specially built for the purpose. Glass furnaces are on/hot for several months, even for years, in a row. This is for practical reasons as it takes time to heat up or cool down the furnace. Unnecessary temperature changes would cause brick erosion and thus shorten the lifespan of the furnace. There are different types and sizes of furnaces. A continuous melt tank furnace is typical for heavier use. Day tanks and crucibles are used in smaller studios.

When a glassblower starts the glassblowing process the first thing is to cool the skin of the glass by using a metal marver[15] or a wet wooden block. Sometimes a pad of wet newspaper is the optimal tool for shaping and cooling. The glassblower pays constant attention to the glass and knows which parts are to be cooled down, or re-heated when necessary. Reading the temperature of the material is a skill that takes time and practice. Molten, hot glass can be stretched and worked into different shapes by using hand tools, usually made of metal, graphite, or wood. Hot glass can be cut with shears and picked or pulled with tweezers. The tooling needs to be done in a way that tool marks do not destroy the aesthetic quality of the glass. Sometimes a pad of wet newspaper or gently moisturized cork is enough to get a smooth form for the glass piece in the making. The

[15] A flat surface of steel, brass, or graphite, (or marble in ancient times).

work requires assertive tooling with a light touch. The volume of the hot gather can be increased by blowing air into it through the blowpipe.

The principle process of getting glass hot and forming it has not changed since ancient times. The composition needs high temperatures (see above) to be melted and kept hot. The glassblower needs to be capable of reading the material and timing their actions to form the material accordingly. Laws of science do not change. The developments that have occurred throughout the centuries include methods of heating (wood, oil, gas, electricity), furnace technology, and advances in compositions (glass recipes). Industrialization did make it possible to automate some parts of the production (window glass and bottles for example) but machines cannot replicate handmade glass blowing techniques. The human touch continues to be essential in the glassblowing process.

MYTHS

In my twenty-year long career in glass I have confronted some misconceptions that I find important to discuss here as background information for this thesis. I hope that an open discussion about these myths help the students in glass (in art, design and/or making) realize that they are not alone in their confusion from these myths. My experiences are from Finland and I can only talk from a personal point of view when I refer to a greater audience and design.

First, it is important to understand that the process of glassmaking and glassblowing itself is a rare practice. It is a form of craft that demands a great amount of tacit knowledge, bodily expertise, and a specific place to practice it. Blowing glass is a special skill and can be compared to, as I mentioned earlier, playing an instrument in an orchestra, or competing in sports. Unlike music and sports, glassblowing is not an everyday topic with a large audience and media coverage. The audience, whether it be a consumer buying a glass product or an art exhibition visitor, does not know how to

relate to glassblowing as there is no common surface to identify oneself with the craft and its makers. That said, the products made of glass often are well known. Especially if the products are designed by a famous designer, these objects have a status of a national treasure. The famous designer and their objects suddenly become a measure (to whom and to what) the student of glass is compared to. This unfair situation brings us to the second mystery to unmask; the relationship between the designer and the glassblower (the maker).

Kaisa Koivisto (2001) raises the designer myth to discussion in her dissertation *Three tales of Glass. Finnish Glass Design 1946–1957*. She explains how designers have been employed in the glass industry since the 1930's, and soon after that, the concept of in-house designer became common. At that time there were four-five major glass factories in Finland (Nuutajärvi, Iittala, Karhula, Kauklahti and Riihimäki). All of them held design competitions and employed designers to create new products for the factory (Koivisto, 2001). To count back in time, it is less than 100 years of design glass in Finland, but the significance of these past decades affects the glass designs and designers of today. Today, as there are no more in-house designer positions in the glass industry, young designers do not have opportunities to learn the trade (as designers). Glassblowers in a factory setting continue to blow the "old designs", and in rare occasions get to work and participate in product development for new designs.

The Studio Glass Movement, that has its inspiration in the 1920's Europe[16], got its manifest in 1962 in Toledo, Ohio, United States. A group of enthusiastic artists and makers concluded that glass can be manufactured in a studio setting similar to independent ceramic artists/artisans' studios. The leading figures of the Studio Glass Movement were Harvey Littleton, Dominick Labino and Erwin Eich[17]. In Europe, the

[16] See Klein & Lloyd (1984) and Whitehouse (2012).

[17] For example: Whitehouse 2012, Byrd & Littleton (2012).

first independent glass studio to be built in accord with the Studio Glass Movements tradition, was in 1968 when Åsa Brandt opened her studio in Torshälla, Sweden.

In Finland, the Studio Glass Movement did not grow as fast nor as big as in the other Nordic countries. Since Mikko Merikallio and Heikki Kallio started as studio glass artists in the 1970's Finland, it has taken about 40 years to reach the situation where we are now; two vocational education programs, five fully functioning glass studios[18] with about 20 glassblowers combined, realizing either their own designs or blowing glass for designers/artists. In my opinion, we cannot talk about a strong studio glass existence in Finland. Glassblowers working with small scale production and artistic glass continue to be compared to industrial design glass.

There are many approaches to grasp the idea of artistic, blown/hot worked glass. We have factory made glass like Aalto vase, or Birds by Toikka (Iittala). Then we have contemporary, small series production tableware (Markku Salo's Diiva and Gina Salaris' Inari as examples) made in a small studio setting. Additionally, we have unique sculptural glass art pieces like Helmi Remes' Gingko Biloba (2016) and Renata Jakowleff's Blue (2017), that I personally think are great examples of artwork that shatter the boundaries of traditional representation of glass in Finland. What is common for these above-mentioned artists/designers is that they all have had a chance to create a passionate, persistent, and pragmatic relationship with glass. Then, what is common with these glass designs and objects of art is, that I have named the factory, the designer, and the artist, and not mentioned anything about the glassblowing process behind the work. My intention is not to take away the importance of artist, but to add a level of understanding and curiosity of the artistic work behind the objects.

This finally brings us to the myth of the glassblower-designer-relationship, and to one of the possible reasons why there are so few aspiring glassblowers-to-be and so many hopeful design-students. When we only admire the results of art, and do not understand

[18] Blown, Hytti ry, Lasismi, Mafka & Alakoski, Nuutajärven lasitaitajat ry, Lasikomppania.

the work behind it, it creates a biased environment for art to be included in life. As a vocational teacher in glassblowing I have witnessed many disappointments when students have realized how difficult it is to blow a tumbler or a jug accordingly to a design. To achieve the wanted thickness, or thinness for that matter, is a result of persistent, years-long practice. I consider the Finnish education system dualistic in a sense, that it offers vocational hands-on practice in glassblowing on secondary level but does not recognize the need for continuous material-based practice in higher education. To create a real discourse for artistic use of glass, education providers should come up with resources for a wide range of academic students to get hands-on training in glass. Otherwise we lose know-how about glass as a material used in art and design. Summarized, the strong myth of glass being designers' material obstructs us seeing it as a material that has potential in art education, and beyond. Further, this myth obstructs us from seeing the human in glassblowing. The glassblower is objectified either as a tool or as an interpreter of someone else's dreams.

GLASSBLOWING IN CONTEMPORARY ART

A closer look into glass in contemporary art reveals that internationally renowned artists like Tony Cragg, Mona Hatoum, Kiki Smith, Koen Vanmechelen and Fred Wilson have all made work in glass (Petry, 2011) As an example, Murano-based Berengo Studios' mission is to encourage the use of glass in contemporary art (Petry, 2011, p.13). I see the work of Berengo Studios as a continuity of the Fucina degli Angeli that collaborated with several artist, Max Ernst and Pablo Picasso included, in the 1950's–60's.

In *The art of not making: The new artist/artisan relationship* Michael Petry (2011) argues that the time of "deskilling" of art education and "dematerialization" of practice appears to be over, and presents contemporary art work in glass, metal, stone, textiles and other materials. Petry (2011) states that the conventional view of an artist working

alone and personally creating unique art with their own hands no longer applies. Instead, artists turn to professional artisans to realize the work. (Petry, 2011, p.6). While Petry describes the collaborative work of artists and artisans, I start to think about art, and artist education, and their objectives. This subject itself is too large to debate in this thesis but I mention it as a hook to remember that some of the pupils and students we educate, one day start working as artists who employ other artists and artisans to work for them– or work as fabricators *for* other artists. The professional image of artists that we, as art educators create, can have a sustained impact on how we (humans) view art and its practices.

GLASS AND SCIENCE

Based on my knowledge in the history of glass, I assume that as soon as clear, transparent glass was invented, its properties benefited the development of optics, and thus science. The so-called reading stones (in use around 1000 CE.) were an early version of magnifying glasses. Later, well into the 1600th Century Dutch Republic, philosopher René Descartes made his suggestion for early contact lenses Baruch Spinoza, a notable philosopher, was a professional glass grinder (Nadler, 2000). From my perspective, as a glassblower and a teacher interested in new materialism in 2020 CE. I am eager to imagine what kind of thoughts crossed the philosophers' minds when they handled glass. My own experience is that the refractive nature of glass invites me to ontological thinking to ponder on the existence. As a side note, it is interesting to notice how important Spinoza is in new materialistic theory[19].

The glass lenses led the way to micro- and macroscopic research. I am ever so fascinated in the evolution of telescopes and how glass as a material is a crucial actant in the development to see further than our immediate environment. Along with optics, glass is an appropriate material in technological and biological sciences. The technical

[19] See for example Dolphijn & can der Tuin (2012) and Bennett (2010).

properties of glass make it a conductor in its hot state, and an insulator when cold. In my opinion, it is not a mobile phone but glass that connects people.

CURRENT GLASS EDUCATION IN FINLAND

Like other skill-based practices, glassblowing also requires continuous training and reflection. Historically, the profession of a glassblower was inherited from father to son. The skill set of a young glassmaker got to grow in a strong master-disciple relationship. Nowadays, glassblowing is included in curricula in both secondary and tertiary education worldwide. One or two-week summer courses are popular, especially in the United States where centers like the Corning Museum of Glass, Haystack Mountain School of Crafts, Penland School of Craft, Pilchuck Glass School, Pittsburgh Glass Center and Urban Glass arrange courses in glass in various techniques, and on different skill levels.

In Finland, as of today, three schools have a hot glass studio: Aalto University, Ikaalinen College of Crafts and Design and Tavastia Vocational College. At Aalto University the glassblowing studio serves mainly students of design, and glassblowing skills per se are not taught at present. The two latter schools, Ikaalinen College of Crafts and Design and Tavastia Vocational College arrange training for Vocational Qualification in Arts and Design. For a beginner in glass, the vocational training takes two to three years depending on earlier general education studies.

In the Finnish vocational education students learn how to implement their skills not only in their own projects, but to blow glass accordingly to customers sketches (customer here being another student, a professional artist or a designer, or someone else who needs a product/an object made of glass). At university, the objectives of learning glass seem to concentrate on the students' personal projects and designing skills. The glass is often realized by a studio master or a hired glassblower.

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As an example of vocational training and education in glass in Finland I summarize the framework I teach from at Tavastia Vocational College.

Tavastia Vocational College arranges vocational training and education in glassblowing on three vocational levels. The basic education functions as a two-year practical introductory training towards the profession and the two further degrees offer supplementary education for glassblowers who already work in the field. The education provided is arranged according to the Finnish legislation (Act on Vocational Training and Education). The physical learning environment is in the historical village of Nuutajärvi in Urjala municipality in south-western Finland.

The qualifications offered are:

Vocational Qualification in Arts and Design[20]
180 competence points
National Qualifications Framework (nqf) 4
European Qualification Framework (eqf) 4
ISCED 3

Further Vocational Qualification in Arts and Design[21]
150 competence points
National Qualifications Framework (nqf) 4
European Qualification Framework (eqf) 4
ISCED 3

Specialist Vocational Qualification in Arts and Design[22]
180 competence points
National Qualifications Framework (nqf) 5
European Qualification Framework (eqf) 5
ISCED 4

[20] https://eperusteet.opintopolku.fi/#/en/esitys/4038058/reformi/tiedot Retrieved May 3, 2020.
[21] https://eperusteet.opintopolku.fi/#/en/esitys/4685456/reformi/tiedot Retrieved May 3, 2020.
[22] https://eperusteet.opintopolku.fi/#/en/esitys/4685457/reformi/tiedot Retrieved May 3, 2020.

The program in glass education started in 1993[23] with an interest to educate new glassblowers to serve the industry. Nuutajärvi Glassworks was one of the most celebrated glass factories in Finland with famous in-house designers leading the way of congenial design and even setting the trends for collectible glassware. The designers were graduates of applied art study programs whereas the glassblowers were industry workers either continuing a family tradition from young age or recruited directly to the industry to learn the trade through working.

Even though times have changed since the 1990's and the need to train glassblowers for industry has somewhat diminished, there continues to be a slight interest towards the program. Collaboration continues now with the Iittala glass factory by providing apprentice training for new recruits at the factory. Today, roughly 1/3 of the glass students of Tavastia are in the factory apprenticeship training to complete the Further Qualification in Arts and Design. The majority of glass students get their training in the Vocational Qualification in Arts and Design at the school studio in Nuutajärvi. At Tavastia glass education, my colleague and I have arranged Protoshop Glass workshops since 2010 as a continuous, collaborative, and pedagogical way to offer glass studio time for design and art students from tertiary education. It is during these workshops that I have noted the growing need and demand for glass studies among students in higher education. Occasionally we have professional artists participating in these workshops. Kirsti Taiviola's *Kehrä* (2018–2019) and *Auringonlaulu* (new, ongoing), exemplify projects that bring students of glass to work in an artists-led project.

RECENT THESES AT AALTO UNIVERSITY

[23] The glass education program was started by Häme Vocational Institute/Wetterhoff in1993, and continues as part of cultural studies at Tavastia Vocational College since 2003.

In recent Masters' theses at Aalto University, Finnish glass education is discussed in the following theses: Vanderlei, A. & Mavrastamos, K. (2014) *A dialogue with glass*, Varvio, E. (2015) *Conscience of glass – Makers of artistic and artisan glass in Finland: realities, vocation and relationship with the industrial past*, and Salonen, G. (2019) *Virhe ja vapaus – taiteellinen tutkimus lasin mahdollisuuksista taiteessa ja opetuksessa.* These first two studies are carried out at the Department of Design and the third one at the Department of Art. I consider my thesis to respond and define some of the issues raised in those studies. As Vanderlei and Mavrastamos (2014) already have contributed excellent knowledge to Aalto University through their investigation of tacit knowledge and the performative, collaborative culture of glassblowing, I do not see reason to explain these concepts again in this thesis. I include Salonen (2019) briefly in a contemplation of further discussion topics in Chapter 4. In this thesis my experience-based autoethnography brings new information to art education from a glass teachers' perspective.

MY AUTOETHNOGRAPHIC VOICE

As a vocational teacher in glassblowing, I have had an opportunity to observe the changing landscape of education and working life in my field closely. After having studied glass and worked as a glassblower for 10 years I started teaching glassblowing fulltime in 2009. I qualified as a vocational teacher in 2012[24]. I am honored to have served the Finnish National Agency for Education as an invited member in educational reform project groups for vocational qualifications in 2013–2014, 2017, and 2018 defining the criteria for skills and competences in glassblowing.

[24] I received my qualification as a teacher from Häme University of Applied Sciences, Professional Teacher Education programme in December 14, 2012.

In my professional life I have followed the international field of contemporary glass as a phenomenon both in craft and in art. I have gotten familiar with different ways of glass education in Europe and in the United States through excursions I have made and courses I have taken. In Finland, I have arranged international glassblowing workshops at Tavastia Vocational College.

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In this chapter I have described elementary information on glassblowing that I consider to be relevant in my study. I have presented my research field largely by resuming some main points in the history of glass, and by briefing what kind of work glassblowing is. I have explained how vocational glass education is structured in Finland, and I have introduced myself as a vocational teacher in glassblowing. In the next chapter I conduct my autoethnographic research through a narrative representation.

CHAPTER 3 / My teaching philosophy

This third chapter is an autoethnographic narrative representation of my pedagogical thinking that has formed from my lived experiences with hot glass during the past twenty years. This representation forms the research material I analyze in Chapter 4 to find answers to my research question - *how does new materialistic thinking appear in my teaching philosophy?*

This chapter is divided into three themes, that are currently present in my teaching philosophy regarding the essential skills in glassblowing. *Body, Posture, Mind* reflects the main instrument of a glassblower, their body. *Balance, Motion, Rhythm* describes the vitality in the glassblowing process. *Memory, Response* strives to make sense of the intellectual, intra-active nature of the matter.

Under each theme, I summarize my pedagogical approach to glassblowing before I was introduced to new materialism. Then, through narrative writing I strive to describe the essential skill in question. In a few places I refer to Erin O'Connor's autoethnographic investigations about glassblowing. In addition, where I can apply them smoothly, I join my thinking to new materialistic theories that I think might match my reasoning to see if they help me to define and clarify my teaching philosophy. As in glassblowing where different processes overlap to create flow-like continuity of the process, hereto my themes do blur into one another. Being aware of this representational unclarity, I seek to present the three topics as logically as possible.

In this chapter I share a few personal memories to reason the foundation of my pedagogical thinking. Further, as mentioned in Chapter 1, I use analogies to offer the reader a means to relate to the glassblowing process by comparing it to more common things, such as walking, drumming, and pizza.

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Before getting into the actual representation, I begin with a quote by Mark Peiser, an American studio glass pioneer, followed by a short introduction to my philosophical fascination with glass.

> *"In the beginning I took up glassblowing with the goal of learning a trade so I could live in the woods. But with time I was drawn into considerations of the implications of transparency upon the world of objects. And my mind's eye began to perceive the volumes of things differently. With more time I began to see glass is not transparent, but is atmosphere and light, and started to compose works of that."*
>
> *Mark Peiser (2014)*

I am fascinated not only by the stunning glass Mark Peiser makes but also by his thoughts as a creator of glass sculptures. To me, his thoroughly honest combination of engineering skills with making art exemplifies the implementation of the *multiplicity of actants*[25] in his working process. I have been lucky to have visited his studio, hidden on a Blue Ridge Mountains slope in Penland, North Carolina, United States twice (in 2009 and 2010). Both times I was blown away witnessing the chemistry and engineering thoughts behind his art objects made of "atmosphere and light".

Whereas my intentions to learn to blow glass were not as clear as Mark's, I did not see practicing my glass blowing trade in the woods, I can fully relate to recognizing one's mind's eye starting to see, or feel, the poetic and metaphysical side of the material. To

[25] *"The term is Bruno Latour's: an actant is a source of action that can be either human or nonhuman; it is that which has efficacy, can do things, has sufficient coherence to make a difference, produce effects, alter the course of events. It is "any entity that modifies another entity in a trial," something whose "competence is deduced from [its] performance" rather than posited in advance of the action. Some actants are better described as protoactants, for these performances or energies are too small or too fast to be "things."* (Bennett, 2010).

me, glass, whether it is an everyday utility ware, a one-off piece, or even a hot drop of glass on a studio floor, it opens a window to thinking with, and beyond the material.

The refraction[26] in glass creates atmosphere and light phenomena, unique attributes known to glass. I remember well a bright, early spring day in my childhood in the late 1970s when I found out how the world looks interesting through a facet cut crystal sphere. I suppose that was when my fascination with glass began, and I understood that the world and its phenomena can be looked at from different perspectives.

Understanding that an object of glass is more than its material appearance, my curiosity guides me to look closer at the actual work of a glassblower. The physical and mental skills intertwine to a seamless flow and do not exist without one another. This understanding has been the base I act from, as a glassblower and a teacher.

BODY, POSTURE, MIND

Glassblowing starts from a good posture and consideration of one's own body. With this understanding the glassblower is thoughtful towards the other humans in the glass studio and respects the glass and the glassblowing tools alike. Glassblowing is about recognizing oneself as a team member. Glassblowing requires a long-term ability to concentrate on the process yet sense 360° around it.

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"How does it feel to work with glassblowing?" "Isn't it hard on your body, you are so tiny!" "Do you have big lungs?" "How often do you get burns?" "I bet there aren't many women blowing glass, are there?" These questions, or presumptions rather, I have kept hearing over the past twenty years. In the beginning, I used to roll my eyes and with my younger attitude firmly answer; *Actually, several women work in glassblowing, and it is not about the physical size or strength of the maker.* Later, I learned better why I was asked these

[26] Refraction as in bending of the light.

questions. I learned how glassblowing is largely defined by masculinity, and that the repetitive nature of work is taxing on any shape or build of body.

In my experience, gender is not an issue in the context of who can blow glass and who can not. When I talk about body, posture, and mind, I literally mean it is neutral. I have worked with humans and taught humans. Issues with holding ones' body and finding the physical and mental flow in blowing glass is the same struggle for everyone.

My interest in the physical body, the posture and the mind derive from my childhood. Without knowing it then, I adapted certain models of behavior. Later, these manners became useful, and I needed to reflect them more for the purpose of teaching ergonomic ways to blow glass.

When I was a child I often played in the woods. I learned to respect the nature and not to leave marks where I had been. My dad told me stories about native Americans who were one with the nature, walked so quietly, leaving no marks. I was intrigued with this idea. Later, as a fourteen-year old, I started practicing Aikido, a modern Japanese martial art. I learned more about movement and how to combine mental and physical presence in action. I learned to use the centered energy in my body for more economic and easy movement. I have been amazed how these kinetic, motor skills, and awareness of ones' mind, have been useful in glassblowing.

When I start teaching a beginner class in glassblowing, I encourage students to first find the center of their body and then exercise a good posture. This is the initial practice of mind and body collaboration. A glassblower uses their whole body to perform the work; the work includes walking, lifting, and sitting while steadily rolling a metal blowpipe, or a punty rod with a mass on one end of it. A glassblowers' body adapts to the work conditions whatever they are. In my opinion, it is important to talk about work ergonomics from the start and to motivate the students to take care of their main instrument, their body.

All body movements start from a posture. How you hold yourself defines how you stand, how you sit, how you walk. A failed posture together with the repetitive nature of work causes muscle injuries of the back and neck area. As glassblowing involves positioning ones' body from one posture to another in a fluid choreography, we need to be aware of every movement to stay physically healthy. Erin O'Connor describes in detail the action of gathering glass from the furnace as follows:

> *"Bringing the blowpipe into the proper holding posture, twirling the blowpipe strongly and with a steady cadence, placing it at the proper leverage point on the ledge, lowering it at the proper speed and placing its tip into the glass at the proper depth – these were all vital components to successfully gathering."* (O'Connor, 2005.)

The action of gathering glass O'Connor outlines here, takes only a few seconds. In that time the glassblower has positioned herself in front of a glowing furnace opening of over 1100 °Celsius (over 2012 °F). She swiftly moves her hands into the proper posture for gathering. Her body is aware, and her muscles know what to do.

A professional glassblower does not, and should not, expose their body to excessive heat to avoid skin irritation or burns caused by infrared radiation. For a beginner, it takes longer to gather. It is advised to use protective sleeves to cover bare arms from radiant heat. Other protective gear such as safety glasses are used to minimize the risk of accidentally getting a shard of glass in the eye. Special IR-glass lenses in safety glasses protect the eyes from the risks of getting cataracts from a lengthy exposure to the infrared radiation. The heat exposure, the physical wear on the body and other occupational health risks are essential factors to be recognized in the beginning stages of learning. As mentioned before, the body is the glassblowers main instrument. Understanding one's own body and its posture, distributing the weight of the work evenly, and using protective equipment are practical implementations of respecting oneself and others. This might sound self-evident, but in my experience it is not.

Pedagogically I understand the human as a comprehensive learner. The mind and body are vital actants forming a coherent, healthy, and happy human condition. The bodily matter we are all made of is a living organism, an active participant in the glassblowing process. According to Jane Bennett (2010) we, humans, are now, in a position to raise the status of materiality to promote our health and happiness. Bennett's perception of human matter explains my own understanding of human beings as heterogeneous compounds of vibrant matter (Bennett, 2010).

The body being the main instrument in glassblowing, the glassblower also uses a set of glassblowing tools to form the hot glass (See chapter 2). In time and with practice, the tools become a bodily extension of the glassblower. O'Connor (2005) reflects Maurice Merleau-Ponty's notion of getting used to such extensions:

> *"Merleau-Ponty's famous discussion of the incorporation of the blind man's stick from an object in hand to an extension of his phenomenal body: The blind man's stick has ceased to be an object for him, and is no longer perceived for itself; its point has become an area of sensitivity, extending the scope and active radius of touch, and providing a parallel to sight. In the exploration of things, the length of the stick does not enter expressly as a middle term: the blind man is rather aware of it through the position of objects than of the position of objects through it... To get used to a hat, a car or a stick is to be transplanted into them, or conversely, to incorporate them into the bulk of our own body. Habit expresses our power of dilating our being-in-the-world, or changing our existence by appropriating fresh instruments. (Merleau-Ponty, 1962: 143)".* (O'Connor, 2005.)

Along with the blowpipe becoming an incorporated extension of the glassblower's body, a glassblower forgets their material body. The only mass that has importance is the glowing, vibrant gather of glass. I have understood this feeling as becoming one with the whole process. The glassblowing situation turns into a one large heterogenous matter that forms one body. It might have several heads, and double the limbs, but only

one heart in the middle, the hot glass. Each team member reads the situation, the temperatures of the glass and acts accordingly respecting each other and the heart in the middle. Learning this ideal glassblowing situation takes a lot of practice.

I consider glassblowers work similar to one of the musicians' and dancers'. In that work the body unites with a greater rhythm and manifestation of material existence. Richard Sennett (2008) analyzes O'Connor's description of her glassblowing process becoming more fluent, by noting that O'Connor no longer thought about what her hands were doing. Instead her consciousness guided the hands to the next move, she was seeing ahead. (Sennett, 2008, p.176.). It is at this moment, the tools becoming a natural bodily extension, and the bodywork becoming so fluent that the glassblower does not need to concentrate on their movement anymore, when the mind becomes free to think about the bigger picture.

This leads us to the next essential skill in glassblowing, balance in motion.

BALANCE, MOTION, RHYTHM

Glassblowing is active, continuous balancing. Glassblowing is problem-solving in motion. Learning to rotate the blowpipe is an essential, motor skill. Glassblowing is about synchronizing oneself in the rhythm with the work. Glassblowing is thinking with the material. Glassblowing is a process of becoming. The becoming welcomes the idea of infinity. Glassblowing is about recognizing the present process as a continuity of the past and as an opening to the future(s).

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It is a brisk sunny day, March 16th, 2020. I have returned to my countryside home three days earlier due to the information coming in on COVID-19. I have self-quarantined as a precaution. When home, I often go for a long walk in the forest, and so I am doing on this very Monday as well. If you have walked in forests, you know how you need to keep

an eye on the terrain and watch your step. Bulging roots, slippery rocks, loose stones, and branches are hazards that you need to be aware of. The more you walk, jog, or run, in these kinds of circumstances, the more fluently you read and estimate the terrain. This, as you may have noticed, results in a more confident, and faster, advancing on your trail.

As I walk there on a narrow path, a thick spruce forest on my left side and sparse trees and a lake on my right side, I arrive to a small clearing, a forest road. The sun now shines behind me. I become aware of my own shadow, growing on the grassy gravel road. Seeing my shadow merging with the ground I start thinking about what it means to be one with your surroundings, what it means to be present in a moment, and how these moments are continuous nanoseconds in a longer time span. My shadow, dependent of the amount of light, affects the life of every grain of sand on the ground. Me sneakers, my feet, my whole body, my clothes… the air, we are the same matter. I do feel that I belong in nature, I feel that I think with everything that is around me because I am part of them, and they are part of me. I am just one of the living creatures in the situation. I happen to be the one who has the responsibility of the well-being of not only my human body but the nature, as well. I decide to take a picture with my smartphone to document and remember the moment.

A few days later, when I return to read Bennett (2010) I get a theoretical confirmation for my thoughts. Bennett writes that she shares Spinoza's faith that "*…everything is made of the same substance.*", and how Spinoza's, and Lucretius', claims about "same-stuff" resonates with something called *ecological sensibility* (Bennett, 2010). This encourages me to think, that I am on the right path with my research question. My curiosity yearns to learn more. What more can I recognize in my own thinking that appears in new materialistic theories?

March 31st, 2020. I know this terrain so well. It is here I do my daily walks. Today, a light veil of snow covers the ground. I need to be careful, pay attention to my steps. It is slippery.

New ideas pop into my mind as I walk, and I need to stop to be able to take field notes on my thinking. I use the notebook on my iPhone. Usually, I can write as I walk, but not today. The weather created a risk, and I need to slow down my pace, and stop to write this. If I was blowing glass, I should not stop the motion of glass even if I paused my own action for a moment. In a glassblowing situation someone else would take over the blowpipe and keep the process ongoing if I needed a pause. If I were to blow glass alone, both the glass and I would become sad were the motion interrupted for some reason.

The process of glassblowing is like walking or jogging in the woods. When you have repeated the same action over and over again, hundreds of times, it becomes a habit. Along the way, you have confronted several new situations that you have learned to solve. In glassblowing these new situations are usually related to the following non-human actors: quality of the ingredients in glass, quality of the melt procedure and the quality of the melt itself, viscosity of the glass, temperatures of the furnace, temperatures of the glass and the head of the blowpipe, rolling the blowpipe and tooling the glass. All in all, it is a great variety of forces that affect the situation. The glassblower balances between these non-human factors, along with human factors in the studio, during the complex process of glassblowing.

For a beginner glassblower every step takes a long time and the glass cools down sooner than the beginner realizes it. A master glassblower works fluently in diverse situations, knowing in advance how to compensate for possible errors. A master glassblower is in motion throughout the process; the body may appear to pause however the mind continues to move.

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Supported by Erin O'Connor's (2005) description of posture, and Jane Bennett's (2010) understanding of humans as vibrant matter in the previous theme, *Body, Posture, Mind,* I look deeper into the physicality of the glassblowing work comparing it to drumming.

This example unites the body and the mind with the sweaty, resilient action, and the rhythm, in the glassblowing process. It also describes how problem-solving is based on professionalism and practice.

Like a drummer coordinates their limbs in simultaneous yet asymmetrical body movements to create tempo and adding beats and fills for their rhythm, a glassblower synchronizes their body movements that result in how fluently the hot glass forms. Like a drummer, a glassblower has their individual embodied manners that make their way of work special. A strong example and a proof that manners manifest the body- and mind-work of an artist, is Rick Allen, drummer in the band Def Leppard. After losing his left arm in a car accident, he learned a new way of expression and created a signature sound in his playing.

I suggest that what helped Allen to solve a physical problem is that thinking with rhythm, sensing the rhythm within, guided him over the hurdle. Likewise, a glassblower, when becoming one with the material and the action, thinks with the material.

The ongoing rhythm in glassblowing joins gross and fine motor skills of the glassblower. The rather invisible fine motor skills, controlled by the mind of the glassblower, make the magic happen. O'Connor (2017) describes in beautiful detail what physically happens when a glassblower rotates the glassblowing pipe:

> *"In order to rotate, the fingers work in opposite directions: the right fingers push, while the left fingers pull. The thumb is pushing in each case. In the gather, both hands aim to achieve and maintain a steady rotation that is fast enough to ensure that the glass remains hot, but slow enough so that it coils around, rather than spins off the pipe. While the left hand is lowered and the right shoulder raised, such that the pipe is angled, the task of each hand differs little: the thumbs alternatively push, while the fingers of the right and left hands push and pull respectively. The hands, with palms facing inwards to achieve a grip, function 'as one' and are trailed by the glassblower's reaching body, firmly footed in her stance before the furnace. As the glassblower rotates the pipe in the molten glass, glass 'gathers' around the pipe, forming an orb."* (O'Connor, 2017.)

This precise description mentions the word *steady.* Steadying is active balancing between the fast and slow rotation. This more recent description by O'Connor reflects on her earlier description (O'Connor, 2005) about the posture I referred to in the previous theme.

James Williams (2018) contribution to the Posthuman Glossary helps me to theorize further the process of glassblowing, and my thinking. Understanding glassblowing as a series of processes that start from a happy, healthy body and continues as a joint operation of several actants, involves the disappearance of the individual. Williams, referring to Nicholas Recher (2000), explains that "*the individual human consciousness, soul, identity, mind and body disappear as independent entities in favour of extended processes.*" (Williams 2018).

MEMORY / RESPONSE

Thinking with the material, a glassblower creates an archive of embodied memory. A glassblower knows that glass too has a memory. Glassblowing is dialogical communication with the other people in the studio, and with the glass.

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I love roasted eggplant on pizza. On one lockdown day, April 5th to be precise, I decided to improve a frozen pizza with eggplant I had. I had not cooked anything with eggplant for a long time – for several months, as I quickly counted in my head. For some reason I had bought it when hoarding all sorts of food not knowing how often I could go grocery shopping in this situation. Also, living in the countryside, I have a long drive to do groceries. But now it was time to do something with the eggplant before it went bad.

I took the eggplant from the vegetable drawer in my refrigerator. I washed it under running water and dried it up, then placed the vegetable on a wooden chopping board. I

took a baking tray I keep in the oven, placed it on the table, and covered it with baking paper. I did all this without thinking, automatically moving around between my refrigerator, the cupboard, the oven, and the table. As I placed the eggplant on a wooden chopping board, I glanced at my kitchen knives on the wall mounted magnet, and then reached for the Japanese kitchen knife I knew is nice and sharp, ready to use. By swiftly eyeballing and chopping the eggplant into about 10 mm thick discs, my mind suddenly went blank. Now what? I had forgotten the next step. It took several seconds for me to figure out that it was the salting I was supposed to do next.

Now, if this incident, forgetting the next step in the process, happened in the glass studio, while blowing glass, I could have lost the piece. Both the glass and I could have become sad as I mentioned in the previous theme when talking about interrupted motion. The motion can be disturbed by a sudden intervention coming from "outside", or it can be my memory that fails me.

The embodied memory, in my reasoning, builds up through repetition. The muscle memory accompanied with cognitive memory are necessary when problem-solving diverse situations in glassblowing.

In my thinking, the symbiotic work of a glassblower and glass is creating new information. The glassblowing process is built on experience-based knowledge and memory. A glassblower working with glass is an action of creating dialogue. This happens because the nature of glass is responsive, and the glass has a memory. The particles that the glass is made of act and react responding to the temperature of the material and the tooling it is exposed to. The glass leads the way while the glassblower responds to the glass.

In an ethnographic article about glassblowing tools Erin O'Connor (2006) reflects on responding to the glass in the following way:

> *"[…], it is only when the glassblower comes to understand and respond to the glass, an understanding made possible through tools that practices of*

> *technique become meaningful and moreover, that glassblowing discourses become substantiated. In this analysis, the material dimension has revealed itself to be a force lending authority to, rather than gaining authority from, language, precisely through tools, and by embodied extension, through hands."* (O'Connor, 2006.)

I agree with O'Connor's description. In her exploration, the glassblowing tools becoming an extension of the body is the subject. My focus in this theme, *Memory, Response* is in the direct feedback the glass gives to my muscular and cognitive systems. The glassblowers thinking, and response is transformed by the glass. An affective turn has taken place.

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The pizza turned out excellent.

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In this chapter I have represented an autoethnographic research about my teaching philosophy. The primary research method has been reflecting on my experienced-based knowledge as a glassblower and a glassblowing teacher. Most of the reflection has happened while walking in my near forest, to which I have direct access from my home. I have taken field-notes while walking, and then started writing a narrative text around those notes once I returned home.

During the research, I have studied new materialistic theories. In the next chapter, I analyze my thinking in the light of these theories.

CHAPTER 4 / CONCLUSIONS AND FURTHER DISCUSSION

In the previous chapters I have presented the theoretical and material framework of my study. I have proposed a written representation of my research that focuses on my pedagogical thinking in certain glassblowing essentials. Through my research method, autoethnographic reflection on my experience-based knowledge, I searched for evidence of new materialistic thinking in my teaching philosophy.

I begin this chapter with a general analysis of my study followed by more detailed conclusions and an answer to my primary research question – *how does new materialistic thinking appear in my teaching philosophy*?

I conclude this thesis by suggesting ideas for further reflection both for academia and myself.

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GENERAL ANALYSIS

The research setting was based on my over twenty-year long professional experience in glassblowing as a maker and a teacher. The research methods were memorizing, reflecting, and writing. To describe the essentials of the glassblowing process I created analogies for a more general understanding.

To answer my research question, *how does new materialistic thinking appear in my teaching philosophy,* I first categorized the essential factors in my teaching in three themes. I used an autoethnographic writing process to describe my experience-based teaching philosophy in its current state. Reading new materialistic theories along with the writing process provided me an opportunity to reflect on my teaching philosophy. This was a slow process since I am new to philosophy and had to think many times over what my relationship was with these theories. I found evidence of possible new materialistic features in my thinking.

My pedagogical thinking seems to have a foundation in my childhood experiences in nature where I learned to respect the environment. From an early age, I adopted a critical view on things, understanding that there is more than one perspective to perceive life from. I have grown to think that the non-human matter around me is lively, thus I better find balance to live in harmony with it.

My research was autoethnographic and I acknowledge that this method does not provide answers to every ethical, aesthetic, intellectual or emotional concern (Adams et al, 2014, p.19). As I examined my own thinking, this method required a great amount of self-criticism, a quality that I happen to have a mastery of.

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CONCLUSIONS

In the section *Body, Posture, Mind,* I mentioned Jane Bennett (2010) elevate the importance of human health and happiness. I explained that I understand the body and mind as a comprehensive material unit that is an active participant in the glassblowing process. I related to Bennett's explanation, that the ethical foundation for vital materialists is in recognizing themselves as vital matter and being surrounded by vital materiality. (Bennett, 2010, pp.12–14.)

Baruch (later Benedict) Spinoza, whom I mentioned earlier in regard to glass and science, and as an inspiration for many new materialist theorists, claimed already in his *Ethics* (1677), that the mind and the body are the same thing. Rick Dolphijn and Iris van der Tuin consider this as the most interesting contribution to a new materialist thinking. (Dolphijn & van der Tuin, 2013, p.94.)

Referring to Spinoza's understanding of conative substance becoming capable of thinking after a transformative process and joining forces with other bodies that *"enhance their power in or as a heterogenous assemblage"*, Bennett (2010) applies this to

vital materialism (Bennett, 2010, pp.22–23). This is how I understood a team of glassblowers working together. The collaborative nature of glassblowing is enhanced by a larger group of individuals working together. Understanding oneself as a part of a larger entity introduces questions of responsibility and respect towards others.

Further, my understanding of the glassblower as a human (and not as a tool, non-human material that serves in a hierarchic system), I consider as a feminist take in my teaching philosophy. Respecting the glassblower as someone who thinks with their material is explained through material feminism.

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In *Balance, Motion, Rhythm,* I explained how glassblowing entails multiple processes that require equilibrium to solve occurring problems. I introduced the idea of becoming one with the matter through thinking with the material in a rhythmical manner.

Williams (2018) clarifies that process ontologies claim reality as a process, not as static existence. Individuality is generally seen as isolated matter and therefore, in process ontologies, replaced with an idea of multiplicities of processes. (Williams, 2018.). In regards of humanism, Williams explains that process ontology can lead to a pragmatic anthropocentrism that shares processes with the non-human (animals, plants, technology). (Williams, 2018). In my case, that sharing is with technology. This is a subject that I need to take into further consideration. I realize that I have a concern about humanisms position in process ontologies. Williams (2018) reminds me that the general definition of humanism is based upon understanding humans as stable and finite individuals sharing a common idea of different matters. Therefore, I should not worry about humanism possibly disappearing in process ontologies. Williams advises to look for post-humanist constructivism in Isabelle Stengers' thinking that follows Whitehead, Deleuze and Guattari, and Rosi Braidotti's concept development of the Deleuze-Guattarian "assemblage" (Williams, 2018).

My teaching philosophy has formed through my practice as a glassblower thinking with my material. Astrida Neimanis (2018) states that material feminism considers that thinking with material articulates "*specific ontological, epistemological and* ethical *commitments.*" (Neimanis, 2018). Early on in my thesis I recognized my understanding of the glass resonated with what Neimanis (2018) presents as material feminism.

The lively matter in material feminism destabilizes the privilege that anthropocentric and humanist ontology have had (Neimanis, 2018). I welcome this understanding to my teaching philosophy as it clarifies my ethical position with glass. I have learned to think with and form understandings with glass which I might not otherwise have encountered. Neimanis asks deliberately, how we honor and give back to these matters, as they have given us "*insights and theories*" (Neimanis, 2018). At present, I see my work as a teacher being one way of giving back by actively questioning the conventional approaches and attitudes to glassblowing and the work of a glassblower. I hope that from my part I can empower students to find their ways to think with glass in Finland.

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The concepts of vibrant matter, material feminism, and process ontologies exist in my teaching philosophy presented in *Memory, Response.* Bennett (2018) summarizes that human cognition and memory is actively constituted by diverse material actants that "*collaborate, divert, vitalize, gum up, twist or turn the groupings in which they participate.*" (Bennett, 2018). I consider memory and response as vibrant outcomes of thinking with material. To me, this is phenomenological evidence that thinking does not happen alone. The hot glass giving a direct response to the glassblower constructs the glassblower's memory. Neimanis (2018), referring to Barad, explains that understanding the non-human matter as agential is a reminder that we are never thinking alone (Neimanis, 2018). Further, I understand that process ontological thinking requires memory and response, otherwise the process would halt.

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The answer to my research question – ***how does new materialistic thinking appear in my teaching philosophy?*** – is as follows:

My teaching philosophy includes features of material feminism, process ontologies and vital materialism, theories that are presented as posthuman and new materialistic approaches to make sense of life and its forms from a non-human centered perspective.

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The discoveries I have made both ease and complicate my thinking. I am empowered in recognizing theories that support my teaching philosophy. At the same time, I realize how much more there is to learn. I value that posthumanism and new materialism allow a vast space where I can rethink and further develop not only my pedagogy but my life.

I see philosophy as a process that I am happy to adopt. At present, I feel like an ocean wave that has just reached the sand on the shore yet is returning to the ocean. As I got to touch the fine grains of knowledge, I yearn to be absorbed in them for a longer time. Now, as I am reporting back into the great ocean, I know what to look for next. Spinoza, Whitehead and Deleuze along with contemporary thinkers mentioned in this thesis are in my field of view.

As a surprise finding during my research, I have come to understand that the molten state of glass, with its' wildly vibrant irregular atomic structure, has become a metaphor for how I understand life.

FURTHER DISCUSSION

I assume that I am not alone with my thoughts and would love to discuss with teachers and educators in glassblowing about philosophical thoughts that arise from our subject matter. I strive to work from an academic platform that adds to the artistic and pedagogical discourse in my field. I look for ways to collaborate with and further the understanding of glass as an artistic material that creates new thinking.

In the introduction I presented another, meta-level research question – *what kinds of phenomena in glassblowing belong in art education and why?* With the perception I have now, I see that art education could offer critical discourse in a practice that is burdened by a one-sided, conventional thinking of design. The phenomena in glassblowing that especially yearns for an art educational approach include *collaborative ways of working*, *practical ways to problem-solve* situations, and *feminism* since women have become more active members in the glass community.

I recognize glass as an extraordinary material for artists to think and research with, especially now, with a new materialistic approach, as the glass has brought us to Anthropocene. Is not it our time to give back to the matter in ethical and just ways? To start this, art education students should have continuous introductory courses in glassblowing. Hot glass teaches students laws of science (movement, energy, gravity) in a practical, vibrant way. I see art educators as the messengers of critical thinking and thinking with material, as teachers who have the position to take material-based thinking to new levels.

As an example, hot glass included in STEAM[27] subjects at schools could evoke early interest as a transdisciplinary form of learning. From a practical point of view, I consider it possible to be arranged at schools near to an educational glassblowing facility as in Ikaalinen, Urjala, and Espoo. The background to this idea is a valuable conversation I had on May 7, 2019 with then graduating art educator Greta Salonen about her views

[27] Science, Technology, Engineering, Art, Mathematics.

in glass education. In her thesis she presents a hot glass workshop for children (Salonen, 2019). During our conversation I learned that Salonen has worked as an educator for children at The Finnish Science Centre Heureka. I suggested it then, and came to think about it now; could an educational hot glass studio at Heureka offer a national platform for school classes to learn about glass – alongside heat recycle and climate change (referencing to greenhouse effect)?

Ecological and environmental aspects in glassblowing are issues that should be looked at in more detail. As new materialism turns the focus from anthropocentrism towards matter, ethical and political questions about global issues such as climate change emerge central (Sanzo, 2018). I am curious to hear what kind of solutions new materialistic thinking could bring to the technical development of practical things like producing heat. Or, do we need new materialistic theories embedded in political decision making, so that simple solutions like heat recycle becomes a favorable implementation in glass factories and studios? As a pragmatist whose own skills do not reach the needed scientific, technical, and economic knowhow, I support resources for transdisciplinary, collaborative actions in making life on our planet vital again.

When I ask myself, why do I advocate hot glass, or material-based feminist thinking in general, I find a direct answer from Jane Bennett:

> *"Why advocate the vitality of matter? Because my hunch is that the image of dead or thoroughly instrumentalized matter feeds human hubris and our earth-destroying fantasies of conquest and consumption."* (Bennett, 2010, p.ix.)

For now, I suggest myself further reading in Spinoza and the process philosophy of Alfred North Whitehead to begin with. I ask myself, what was Spinoza looking at when grinding lenses and inspecting their quality? Did he know glassblowers personally, did he have an entry to a hot glass workshop? Examining glassblowing more thoroughly

with process ontologies could bring worthwhile information on education planning when working with collaborative processes. So far, I have only read Whitehead for a short time. I like to think about glassblowing, and life in general as infinity. When Whitehead starts a lecture (1941, April 22, at Harvard Divinity School) stating that *"[T]here is finitude – unless this were true, infinity would have no meaning."* (Whitehead, 2014, p.94). I notice that I need to start thinking over. Whitehead further explains that *"…the fundamental metaphysical truth that every entity involves an indefinite array of perspective, each perspective expressing a finite characteristic of that entity."* as the base for the contrast of finitude and infinity to arise from (Whitehead, 2014, p.94.)

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a hot liquid note
growing in all directions
glass carries the light

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JOSIAH MCELHENY
Observation Night Six
2019

Acrylic on board with inset, hand-formed and polished micromosaic glass,
black mirror, ash frame
55.6 x 55.6 x 5.4 cm

Image courtesy of James Cohan Gallery, New York, New York, United States.

REFERENCES

Adams, T. E., Holman, J. S., & Ellis, C. (2014). *Autoethnography : Autoethnography.* Oxford University Press, Incorporated. https://ebookcentral.proquest.com

Adams, T. E., Holman, J. S. (2017). The Art of Autoethnography. Leavy, P. (Ed.). (2017). *Handbook of arts-based research.* Guildford Publications. https://ebookcentral.proquest.com

Baltas, A. (2012). *Peeling potatoes or grinding lenses : Spinoza and Young Wittgenstein converse on immanence and its logic.* University of Pittsburgh Press. https://ebookcentral.proquest.com

Barnard Center for Research on Women. (2018, July 20). Karen Barad: Undoing the Future [video file]. Retrieved from https://www.youtube.com/watch?v=bMVkg5UiRog April 19, 2020.

Bartleet, B., & Ellis, C. (Eds.). (2009). *Music autoethnographies : Making autoethnography sing/making music personal.* Australian Academic Press. https://ebookcentral.proquest.com

Bennett, J. (2010). *Vibrant matter: A political ecology of things.* Durham, N.C.: Duke University Press.

Bennett, J. (2018). Vibrant Matter. In Braidotti, R., & Hlavajova, M. (Eds.). (2018). Posthuman glossary. Bloomsbury Publishing Plc. Retrieved from http://ebookcentral.proquest.com

Braidotti, R., & Hlavajova, M. (Eds.). (2018). Posthuman glossary. Bloomsbury Publishing Plc. Retrieved from http://ebookcentral.proquest.com

Byrd, J., & Littleton, H. (2011). *Harvey K. Littleton : a life in glass : founder of America's studio glass movement /.* New York: Skira Rizzoli Publications.

Coole, D. H. & Frost, S. 2010. *New materialisms: Ontology, agency, and politics.* Durham [N.C.]: Duke University Press.

Corning. (2016). Innovation. The Glass Age: The Next Frontier. Retrieved from https://www.corning.com/worldwide/en/innovation/the-glass-age/inspiration/advancing-the-glass-age.html May 11, 2020.

Corning Museum of Glass. (2014, April 25). Meet the Artist Mark Peiser | Behind the Glass Lecture. Retrieved from https://www.youtube.com/watch?v=MUC4fcOnSyg March 10, 2020.

Dolphijn, R. & Van der Tuin, I. (2012). *New materialism: Interviews & cartographies.* Ann Arbor: Open Humanities Press.

Elävä perintö (2020, February 11). Lasin puhaltaminen. https://wiki.aineetonkulttuuriperinto.fi/wiki/Lasin_puhaltaminen Retrieved May 7, 2020.

Flygt, E. & Falk, T. (2011). *An introduction to glass: Craft, technology and art* (3rd edition.). Stockholm: Infotain & Infobooks : Glafo.

Fucina degli Angeli (n/a). Opere. Retrieved from http://www.fucinadegliangeli.com/opere.html May 4, 2020.

Glasstress. (2019). Artists. Retrieved from http://glasstress.org/artists/ May 4, 2020.

Henderson, J. (2013). *Ancient glass: An interdisciplinary exploration.* Cambridge University Press.

Koivisto, K. (2001). *Kolme tarinaa lasista: Suomalainen lasimuotoilu 1946–1957.* Riihimäki: Suomen lasimuseo.

Klein, D. & Lloyd, W. (1984). *The history of glass.* London: Orbis.

Lakoff, G. & Johnson, M. (1980). *Metaphors we live by.* Chicago: Univ. of Chicago press.

Leavy, P. (Ed.). (2017). *Handbook of arts-based research.* Guildford Publications. https://ebookcentral.proquest.com

Metsänkylä, A. & Suutari, P. (1992). *Työryhmä: verstakko: Raportti lasinpuhalluksesta Nuutajärven lasitehtaalla.* Helsinki: Museovirasto.

Murray, M., & Kujundzic, N. (2005). *Critical reflection : A textbook for critical thinking.* MQUP. https://ebookcentral.proquest.com

Nadler S. (2000). Baruch Spinoza: Heretic, Lens Grinder. *Arch Ophthalmol.* 2000;118(10):1425–1427. doi:10.1001/archopht.118.10.1425 Retrieved May 11. 2020.

Neimanis, A. (2018). Material Feminism. In Braidotti, R., & Hlavajova, M. (Eds.). (2018). Posthuman glossary. Bloomsbury Publishing Plc. Retrieved from http://ebookcentral.proquest.com

Nurmi, V. (1989). *Lasinvalmistajat ja lasinvalmistus Suomessa 1900-luvun alkupuolella.* Helsinki: Suomen muinaismuistoyhdistys.

O'Connor, E. (2005). Embodied knowledge: The experience of meaning and the struggle towards proficiency in glassblowing. *Ethnography, 6*(2), 183–204. https://doi.org/10.1177/1466138105057551

O'Connor, E. (2006). Glassblowing Tools: Extending the Body Towards Practical Knowledge and Informing a Social World. *Qualitative Sociology, 29*(2), pp. 177-193. doi:10.1007/s11133-006-9013-1

O'Connor, E. (2009). *Hotshop: An ethnography of embodied knowledge in glassblowing.*

O'Connor, E. (2017). Touching tacit knowledge: Handwork as ethnographic method in a glassblowing studio. *Qualitative Research, 17*(2), pp. 217-230. doi:10.1177/1468794116686651

Petry, M. (2011). *The art of not making: The new artist/artisan relationship.* London ; New York: Thames & Hudson

Perfect Lens. (2020). The history of contact lenses: Unearthing the Time Capsule. Retrieved from https://www.perfectlens.ca/articles/history-of-contact-lenses-time-capsule Retrieved May 11, 2020.

Rick Allen (n/a). Mucisian. Retrieved from https://rickallen.com/musician/ Retrieved April 12, 2020.

Salonen, G., Suoniemi, M., korkeakoulu, T. j. s., School of Arts, D. a. A., laitos, T., Art, D. o., . . . Aalto-yliopisto. (2019). *Virhe ja vapaus - taiteellinen tutkimus lasin mahdollisuuksista taiteessa ja opetuksessa.*

Sanzo, K. (2018, April 25). Genealogy of the Posthuman. *New Materialism(s).*Retrieved from https://criticalposthumanism.net/new-materialisms/ May 9, 2020.

Sennett, R. (2009). *The craftsman.* London: Penguin Books.

Studium Generale Rietvield Academie. (2018, June 27). On Touching: The Alternity Within, Karen Barad [video file]. Retrieved from https://www.youtube.com/watch?v=u7LvXswjEBY April, 19.2020.

Suomen lasimuseo (2020). Uta Lauren: The Living Heritage of Glassblowing. The Finnish Glass Museum. https://www.finnishglass.fi/elavaperinto. Retrieved May 7, 2020.

Van Der Lei, A., Kauppila, T., Salakari, E., korkeakoulu, T. j. s., School of Arts, D. a. A., laitos, M., . . . Aalto-yliopisto. (2014). *A dialogue with glass.*

Whitehead, A. N. (1941/2014). *Science and philosophy.* Philosophical Library/Open Road. https://ebookcentral.proquest.com

Whitehouse, D. (2012). *Glass : a short history /.* Washington, DC: Smithsonian Books.

Williams, J. (2018). Process Ontologies. In Braidotti, R., & Hlavajova, M. (Eds.). (2018). Posthuman glossary. Bloomsbury Publishing Plc. Retrieved from http://ebookcentral.proquest.com

PHOTOGRAPHS:

Hulkkonen, S. (2017). View into a glass furnace in Brooklyn, New York.

McElheny, J. (2019). Observation Night Three. Image courtesy of James Cohan Gallery, New York, New York, United States.

McElheny, J. (2019). Observation Night Six. Image courtesy of James Cohan Gallery, New York, New York, United States.